at Vicksburg, Miss., and New Orleans, La., throughout the month. It was above the danger-line at Cairo, Ill., until the 19th, and at Memphis, Tenn., until the 22d. On the 3d a break occurred in the levee about 2 miles below Longwood, Miss. On the 5th a break occurred in the newly constructed levee built to protect Gretna, La., from the overflow from the Ames Crevasse, flooding the rear portion of the town. On the 10th water from the Ames Crevasse broke through the rear protection levee on the Concession Plantation, 20 miles below New Orleans. At the close of the month high water prevailed in the upper Rio Grande river and in the streams of New Mexico, and at El Paso, Tex., the water was the highest ever known for the season. The water was also high in the Brazos River, Tex. Navigation opened at Oswego, N. Y., on the 4th, at Toledo, Ohio, on the 5th, at Sandusky, Ohio, on the 7th, at Erie, Pa., on the 11th, and at Buffalo, N. Y., on the 14th. On the 19th the first boat of the season passed through the Straits of Mackinac. The first boat arrived at Sault de Ste. Marie, Mich., on the 27th. Navigation opened at Duluth, Minn., on the 30th. The first boat from Milwaukee, Wis., arrived at Green Bay, Wis., on the 13th. The first boat of the season left Port Huron, Mich., on the 19th, and the first boat of the season arrived at that port on the 20th. Navigation opened at La Crosse, Wis., on the 12th, and at Fort Sully, S. Dak., on the 26th.

Over a great part of the south Atlantic and east Gulf states dry weather impeded farming operations, and in Mississippi and Louisiana crops suffered from drought. At the close of the month forest fires were raging in the mountains near Cumberland, Md. Extensive forest fires prevailed near Blue Knob, Reading, and Ashland, Pa., and Egg Harbor City, May's Landing, and Tom's River, N. J.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for April, 1891, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on Chart II by isobars. The departure of the mean pressure for April, 1891, obtained from observations taken twice daily at the hours named, from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Moorhead, Minn	+.001	Cleveland, Ohio	.000
Chicago, Ill	+.002	Saint Paul, Minn	.000
Duluth, Minn	+.003	Saint Louis, Mo	—.004
Atlanta, Ga	+.004	New Orleans, La	—.005
Pittsburg, Pa	+.006	Denver, Colo	—.006
Eastport, Me	+.007	Omaha, Nebr	—.007
Washington City	+.007	Abilene, Tex	—.007
Key West, Fla	+.007	Memphis, Tenn	—.008
Lynchburgh, Va	+.009	Fort Assinniboine, Mont	—.009
Albany, N. Y	+.010	Santa Fé, N. Mex	—.010
New York City	+.011	Salt Lake City, Utah	—.010
Jacksonville, Fla	+.011	San Francisco, Cal	—.015
Boston, Mass	+.014	El Paso, Tex	—.019
Wilmington, N. C	+.016	Yuma, Ariz	—.025

The mean pressure was highest east of the Mississippi and south of the Ohio rivers, and along the middle and north California coasts, where it was 30.05 or above. The mean pressure was lowest over the Canadian Maritime Provinces, in the British Possessions north of Montana, and over the west part of the southern plateau, where it was below 29.90.

A comparison of the pressure chart for April, 1891, with that of the preceding month shows that there was a general decrease in mean pressure over the central, north, and extreme west parts of the country, while from the southern plateau eastward to the south Atlantic coast there was an increase in mean pressure. The greatest decrease in pressure occurred over the extreme northeast part of the country and in Manitoba, where it was .20 or more, and the most marked increase in pressure was noted on the middle and west Gulf coasts, where it amounted to .05. In the preceding month the mean pressure was highest over the northeastern and north-central parts of the country and on the north Pacific coast, where it was above 30.10, and the mean pressure was lowest over the southern plateau, where it was below 29.95.

The mean pressure was above the normal, except in districts lying north of the 45th parallel, and over the extreme southwest part of the country. The greatest departure above the normal pressure occurred from the Carolinas and Virginia westward to the middle-eastern slope of the Rocky Mountains and thence southeastward to the west Gulf coast, where it was more than .05, and the most marked departure below the normal pressure was noted at stations on the coast of the Gulf of Saint Lawrence and on the north Pacific coast, where it was .05 or more.

The monthly barometric range at each station of the Signal Service is given in the table of Signal Service data.

AREAS OF HIGH PRESSURE.

I.—This high area was central north of North Dakota and Montana from the 1st to the 3d. It then moved directly south to Texas, where it was central on the 5th; it then moved eastward to the coast of Florida, reaching that point on the 7th. The temperature fell from 12° to 22° on the 1st from the Dakotas to Kansas; on the 2d the cold wave extended over the Lake region and the Ohio Valley; continued over these districts on the 3d, and extended to the Gulf States. A further fall in temperature occurred in the Gulf and south Atlantic states on the 4th, and in the last-named states on the 5th. Freezing weather occurred in Tennessee during the nights of the 4–5th; light frosts occurred in the Gulf States on the night of the 4th; and killing frost during the night of the 5th, and as far south as Titusville and Jupiter, on the eastern coast of Florida, during the night of the 6th.

II.—Was central near Lake Superior during the 6th, 7th, and 8th, on the south New England coast on the 9th, and moved thence northeastward to Nova Scotia. The temperature falls were slight and limited in area. Under its influence fair weather prevailed in the Lake region from the 6th until the 9th and continued in New England until the 10th, with temperature differing very slightly from the normal.

III.—This area of high pressure was central in Colorado on the 10th, in Arkansas on the 11th, moved northeastward to Virginia during the 12th, and disappeared off the North Carolina coast on the 14th. It caused but slight falls in temperature, and the southern course pursued by the centre, in connection with the advance of low area No. III, caused very decided rises in temperature in the central portions of the United States during the 12th and 13th and in the Atlantic coast districts during the 14th.

IV.—This high was central in Montana on the 12th and passed along the northern boundary of the United States and reached the Gulf of Saint Lawrence on the 15th. There was a fall of from 10° to 15° in temperature in advance of the centre in the extreme northern districts. A maximum velocity of 32 miles from northeast was reported from Eastport, Me., during the night of the 14th.

V.—A rise of four-tenths of an inch in pressure over the lower lake region on the 15th was the commencement of a high area that passed from that point to the south New England coast and thence down the coast to South Carolina, where it was central on the 18th. There was a slight fall in temperature in the middle and south Atlantic states on the 16th, but as the centre of the high moved to the south there was a general and decided rise in temperature in New England and the middle Atlantic states during the 17th and 18th.

VI.—The path followed by this high was from Montana to Kansas, thence across the Lake region to Rhode Island, and from that point southward to the South Carolina coast. The temperature fell from 10° to 15° on the 20th and 21st in New England and the middle Atlantic states, but rose about the same amount on the 22d.

VII.—The path of this area is traced from the coast of California, where it was central on the 21st, to Colorado, where it remained nearly stationary from the night of the 21st until the 22d. During the night of the latter date it moved to Lake Superior, thence southward to northern Illinois, eastward to Lake Erie, and on the night of the 27th was over South Carolina. A maximum wind velocity of 52 miles per hour was reported from Cape Hatteras during the night of the 25th. There was a general fall in temperature in the districts east of the Mississippi River on the 23d, the greatest fall being from 25° to 30° in New England. The fall continued in the lower lake region and the middle and south Atlantic states during the 24th. In New England there were but slight changes on this date, but there was a further fall of 10° the next day.

VIII.—The track of this high is traced from the Pacific coast eastward to Wyoming from the 24th to the 27th. On the 28th the centre was in Texas, moving during the day to Indiana. On the morning of the 30th it was on the South Carolina coast. The temperature fell 20° to 30° in Montana on the 24th, and about the same amount in the Missouri Valley on the 26th. Falls of equal amount were felt from the Lake region to New England on the 27th and 28th. Northwest gales prevailed in the Lake region on the 27th and 28th, and on the Atlantic coast on the 28th and 29th.

IX.—This area was over the north Pacific coast from the 28th until the 30th of the month. Its only effect up to the end of the month had been to clear the weather in Washington and Oregon.

AREAS OF LOW PRESSURE.

I.—On the morning of the 1st a trough of low barometer extended from the upper lakes southwestward to Texas, with centres of low pressure over Lake Superior and northern Texas. The northern centre disappeared during the day and the area of low pressure in Texas moved northeastward to Indiana, thence to the Virginia coast, and passed up the Atlantic coast to Nova Scotia. Rain fell on the 1st in the Gulf States, Missouri, Kansas, and Colorado, and snow in the northwestern states. The area of precipitation extended during the 2d over the Lake region, Ohio Valley, middle Atlantic states, and southern New England, with easterly gales from Cape Hatteras to Cape Cod. Snow, with high northwest winds, prevailed over the Lake region on the 3d, the snow area extending southward to the Ohio Valley. The winds on the Atlantic coast south of Portland, Me., shifted to the northwest during the night of the 2d. The storm was very severe on the New England coast. The maximum velocities from the east ranged from 60 to 72 miles per hour. At Boston, Mass., the barometer fell one inch between 8 p. m. of the 2d and 8 a. m. of the 3d. On the northern coast of Maine the wind continued from the northeastward until the night of the 3d, a maximum velocity of 60 miles being reported from Eastport. Heavy snow fell in New England during the night of the 2d.

II.—This storm was central on the coast of Washington on the 6th, in Montana on the 7th, in Nebraska on the 8th, in Iowa on the 9th, and over Lake Superior on the 10th. Its course from that point was eastward to the Gulf of Saint Lawrence, where it was central on the 13th. Rain fell on the north Pacific coast on the 6th and 7th, rain or snow in the Dakotas on the 8th, and in the upper Mississippi valley and upper lake region on the 9th. The area of precipitation extended over the lower lakes and the Ohio Valley on the 10th, and over New England and the middle Atlantic states on the 11th. High easterly winds prevailed on the upper lakes on the 9th, on the lower lakes on the 10th, and velocities of 25 to 35 miles per hour were reported from the south New England coast on the 11th. Owing to the presence of two areas of high barometer, one central in the extreme northern and the other in the extreme southern portion of the United States, the temperature changes in advance of the storm were irregular. The greatest changes occurred in the Ohio Valley, where the temperature was 10° to 16° above the normal on the 9th, and over the lower lake region, where it was 10° to 18° above the normal on the 10th.

III.—This low area was central north of Montana on the 10th. Its general course was southeastward to northern Texas, where it was central on the 13th. From that point its course was northeastward to the lower lakes and thence to Nova Scotia, where it appeared central on the 15th. Showers were reported from Iowa and Missouri on the 12th, and from the upper Mississippi valley and upper lakes on the 13th. On the 14th and 15th the rain area included the Lake region, extending during the latter date to New England. Brisk and high winds prevailed near the Lake region on the 13th and 14th. Velocities of 30 to 40 miles per hour were reported from the Maine coast on the 15th. The temperature rose 10° to 18° in the upper Mississippi and Missouri valleys on the 11th, and generally east of the Mississippi River on the 12th. On the 13th the temperature was 10° to 20° above the normal, and 10° to 15° above in southern New England and the middle Atlantic states on the 14th.

IV.—On the morning of the 19th this low area was central north of Montana. It moved southeastward to South Dakota, and thence to the upper lake region, from which point it moved eastward to the Gulf of Saint Lawrence. Rain fell in the upper Mississippi and Missouri valleys on the 16th; during the 17th the rain area extended southward to Texas and eastward to include the upper lakes; high southwest shifting to northwest winds prevailed in the upper Mississippi and Missouri valleys during these two dates. The highest velocity reported from a Lake station during the passage of the storm was 26 miles per hour at Toledo, Ohio. On the 18th the rain area included the middle Atlantic states, lower lake region, and the Ohio Valley and Tennessee, and during the night extended to New England. There was a general rise in temperature in advance of the storm; the greatest rise being 20° in the Lake region and Ohio Valley on the 17th, and a further rise of 10° on the 18th. The temperature in New England and the middle Atlantic states was from 15° to 20° above the normal on the morning of the 19th.

V.—This low area was central in Colorado on the night of the 17th. It moved during the night to Wyoming, and thence southward to southern New Mexico, where after remaining nearly stationary for two days its energy was dissipated. Rain fell in the lower Mississippi valley on the 16th, 17th, 18th, and 19th. Heavy gales prevailed on the Texan coast during the 19th and 20th, the highest velocity reported being 60 miles per hour from the nw. at Corpus Christi.

VI.—This low area appeared central north of Montana on the 18th. During the next day it remained nearly stationary. It moved eastward during the 20th and 21st, and on the 22d was north of the Lake region. It was central on the coast of Maine on the morning of the 23d, and during the day moved northeastward to the Gulf of Saint Lawrence. From the 18th until the 20th it was separated from low area No. V by a low ridge of higher pressure, being in fact one centre of an extensive area of low pressure, the other centre being area No. V, central in the southern part of the United States; after the disappearance of this area, No. VI increased in energy and began its movement to the eastward. Under the joint action of these two lows rain fell in the districts west of the Mississippi on the 19th, 20th, and 21st. The rain area in advance of No. VI extended to the Lake region on the 21st and to the Ohio Valley and middle Atlantic states during the 22d. The rain continued in the lower lake region, Ohio Valley, and middle Atlantic states during the 23d, the area of precipitation extending to New England and the south Atlantic states. Wind velocities ranging from 20 to 40 miles per hour were re-

ported from the Lake region, and a maximum velocity of 52 miles from the south New England coast on the 22d. The winds continued high on the New England coast on the 23d. The rise in temperature in advance of the centre was about 10°; it rose 10° to 20° above the normal in New England and the middle Atlantic states on the 22d.

VII.—This storm was central north of Montana on the 21st; it followed very closely the track of No. VI in its eastward movement to the Gulf of Saint Lawrence, where it was central on the 28th. The only precipitation reported was in the upper lake region, where local rains accompanied the fall in temperature after the centre had passed to the eastward. In connection with the absence of precipitation is noted the continued high wind velocities that accompanied the storm. On the 25th the wind in the Missouri Valley was from the south, with velocities of 25 to 35 miles per hour, and the temperature rose 15° to 25° above the normal. In Manitoba it was 25° to 38° above the average for the last decade of the month. The high winds continued in the Western States until the 27th, and on this day the velocities reported for the Lake region ranged from 20 to 40 miles per hour. The greatest change in temperature was a rise of 30° in the upper lake region on the 26th and 30° in New England on the 27th. There was a very marked difference in temperature between the east and west sides of the storm. The evening temperature at the centre remained from 75° to 85° (or 20° to 30° above the normal) until it reached New England where it was about 10° lower.

VIII.—This storm started and followed in nearly the same path as the two preceding ones; it was characterized, as was No. VII, by an almost total absence of precipitation and continued high winds and warm weather. Showers were reported from the southern portion of the Lake region and from the Ohio Valley on the 30th, and high winds from the upper Mississippi and Missouri valleys on the 28th and 29th, from the Lake region on the 29th and 30th, and from the Atlantic coast stations on the 30th. The greatest rise in temperature was 36° over the Lake Superior region on the 29th. The rise in temperature on the Atlantic coast was from 10° to 20°.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change and maximum abnormal temperature change in twelve hours and maximum wind velocity.								
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	1	52	109	27	80	6.0	23	Port Arthur, Ont	.30	3	Nashville, Tenn	18	2	Chicago, Ill	n.	40	3
II	6	50	85	43	67	5.0	19	Sydney, C. B. I	.40	8	Lynchburgh, Va	9	10	Block Island, R. I	nw.	34	7
III	10	38	109	33	75	5.0	19	Valentine, Nebr	.24	10	Springfield, Ill	12	10	Valentine, Nebr	nw.	48	9
IV	12	49	107	48	64	2.5	33	Saint Vincent, Minn	.48	13	Concordia, Kans	26	13	Fort Sully, S. Dak	nw.	38	12
V	15	42	85	33	77	3.0	22	Buffalo, N. Y	.22	15	Oswego, N. Y	8	15	Kitty Hawk, N. C	sw.	34	18
VI	17	51	110	33	78	5.5	27	Fort Sully, S. Dak	.40	17	Port Huron, Mich	17	19	Valentine, Nebr	nw.	38	17
VII	21	42	124	34	79	6.0	33	Rockliffe, Ont	.28	23	Rockliffe, Ont	16	23	Northfield, Vt	nw.	36	23
VIII	24	41	124	32	80	5.5	32	Denver, Colo	.56	26	Huron, S. Dak	32	26	Cheyenne, Wyo	nw.	44	26
Mean						4.8	26		.36			17				39	
Low areas.									Fall.			Rise.					
I	1	38	99	48	61	4.0	26	Boston, Mass	1.02	3	Jacksonville, Fla	11	2	Boston, Mass	se.	60	3
II	6	47	125	49	64	7.0	23	Eureka, Cal	.40	6	Indianapolis, Ind	16	9	Fort Canby, Wash	se.	60	6
III	10	52	116	43	64	5.0	35	Pueblo, Colo	.30	11	Grand Haven, Mich	17	13	Eastport, Me	ne.	38	15
IV	15	52	112	47	59	3.5	35	Saint Paul, Minn	.38	16	Pittsburg, Pa	22	17	Sioux City, Iowa	s.	52	16
V	17	38	109	33	103	3.0	17	Santa Fé, N. Mex	.18	20	Palestine, Tex	14	20	Corpus Christi, Tex	nw.	60	20
VI	18	52	115	48	60	6.0	22	Portland, Me	.34	22	Sandusky, Ohio	21	22	Block Island, R. I	sw.	52	22
VII	21	53	116	48	63	7.0	17	Prince Albert, N. W. T	.50	22	Helena, Mont	22	22	Fort Sully, S. Dak	s.	46	25
VIII	27	53	113	47	77	3.0	25	Saint Vincent, Minn	.52	28	Duluth, Minn	26	29	Saint Paul, Minn	se.	38	28
Mean						4.8	25		.45			19				51	

NORTH ATLANTIC STORMS FOR APRIL, 1891 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the west part of the north Atlantic Ocean during April, 1891, are shown on Chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

A notable feature of April, 1891, was the unusual number of storms which appeared in the middle latitudes, several of which moved eastward to mid-ocean south of the trans-Atlantic steamship routes, and at least two of these passed eastward over the Bay of Biscay. Of the storms traced but one was severely felt over the ocean; this storm advanced northeast along the Atlantic coast of the United States during the 2d and 3d, attended by severe gales which caused damage to shipping and seaside property.

The month opened with low pressure along the trans-Atlantic steamship routes. A storm with pressure below 29.40 (747) and fresh to strong gales was central east of Newfoundland, having advanced from south of Newfoundland where it was central March 31st; a storm of moderate energy was central northeast of Bermuda, where the pressure fell to 29.80 (757) at 4 p. m., with a sw. to w. gale; the pressure was low over mid-ocean; and a storm with pressure below 29.50 (749) was central west of the British Isles. On the 2d the storm east of Newfoundland on the 1st had moved ne. of the Grand Banks, with pressure below 29.10 (739); the storm near Bermuda had moved e. about 10°; and the storm over the eastern part of the ocean had advanced to the British Isles, with pressure 29.40 (747) in Ireland. The evening of the 2d a storm of considerable strength which had advanced from the Ohio Valley was central near Cape Hatteras. By the morning of the 3d the Cape Hatteras storm had moved to the s. New England coast, with pressure below 29.40 (747); the Bermuda storm had advanced to se. of the Grand Banks; the pressure continued low over mid-ocean; and the barometer fell to 29.20 (742) at Valentia, Ireland. The morning of the 4th the Atlantic coast storm had advanced to New Brunswick, with pressure below 29.30 (744) and fresh to strong gales; the Bermuda storm was central w. of the Azores; and the pressure was below 29.30 (744) west of Ireland. During the 5th and 6th the storm central over New Brunswick on the 4th moved northeastward over the Gulf of Saint Lawrence and north Newfoundland and disappeared north of the region of observation, and the pressure was low and a storm was apparently central near the Azores.

On the 5th the pressure fell below 29.50 (749) nw. of Ireland. On the 6th the pressure was low over the British Isles, and a